1. Define Power BI and What are the key components of the Power BI ecosystem? Briefly explain
   - Power BI Desktop
   - Power BI Service
   - Power BI Mobile
   - Power BI Gateway

Power BI is a business analytics tool developed by Microsoft. It is used to collect, analyze, and visualize data to create interactive reports and dashboards. Power BI helps organizations make better decisions by converting raw data into meaningful insights.

Main Components of Power BI:

Power BI Desktop:-
It is a Windows-based application used to create reports and data models. Users can connect to different data sources, clean data, and build visualizations.
Power BI Service:-
It is an online (cloud-based) platform where reports and dashboards created in Power BI Desktop are published, shared, and accessed by others.
Power BI Mobile:-
This allows users to view reports and dashboards on mobile devices like smartphones and tablets anytime, anywhere.
Power BI Gateway:-
It is used to connect on-premises data sources (like SQL Server or Excel stored locally) with Power BI Service so that data can be refreshed automatically.

2. Compare the following Power BI visuals:
   - Pie Chart vs Donut Chart
   - Bar Chart vs Column Chart

When would you prefer one over the other? Give one example for each pair.

1. Pie Chart vs Donut Chart
Pie Chart:
A pie chart shows data as slices of a circle to represent proportions of a whole.
It is simple and easy to understand when there are only a few categories.
Donut Chart:
A donut chart is similar to a pie chart but has a hole in the center.
The center space can be used to display total values or key information, making it more informative and visually appealing.
When to prefer one over the other:
Use a Pie Chart when you want a very simple view of percentage distribution.
Use a Donut Chart when you want to show totals or additional details in the center.
Example:
Showing market share of products: Pie chart for simple view, Donut chart to show total sales in the center.
2. Bar Chart vs Column Chart
Bar Chart:
Displays data using horizontal bars.

Best when category names are long or when comparing many categories.
Column Chart:
Displays data using vertical columns.
Useful for showing trends over time or comparing values across categories.
When to prefer one over the other:
Use a Bar Chart when labels are long or there are many categories.
Use a Column Chart when analyzing trends or time-based data.
Example:
Comparing sales by region: Bar chart for many regions, Column chart for monthly sales trends.

3. Explain the significance of:
   ● Star schema vs Snowflake schema
   ● Primary key vs Foreign key in relationships (Power BI) Why is cardinality important?

1. Star Schema vs Snowflake Schema

Star Schema :- A star schema consists of:

- One central fact table (e.g., Sales, Orders)
- Multiple dimension tables directly connected to the fact table

Significance in Power BI:

- Faster query performance
- Easier DAX calculations
- Recommended modeling approach in Power BI

Example:-
Fact_Sales → Dim_Date, Dim_Product, Dim_Customer, Dim_Region

Snowflake Schema

A **s**nowflake schema is an extension of the star schema where:

- Dimension tables are further normalized into sub-dimensions

Significance in Power BI:-

- Harder to manage relationships
- Increased model complexity
- Generally avoided unless required for storage optimization

2. Primary Key vs Foreign Key in Relationships (Power BI)

Primary Key (PK)

- Uniquely identifies each record in a table
- No duplicates and no null values
- Usually present in dimension tables

Example:
`CustomerID` in Dim_Customer

Foreign Key (FK)

- Refers to the primary key of another table
- Used to create relationships between tables
- Typically present in fact tables

Example:
`CustomerID` in Fact_Sales

Significance in Power BI

- Enables accurate table relationships
- Ensures correct filtering and aggregation
- Prevents ambiguous relationships
- Supports proper data modeling and reporting

4 : Differentiate between:

● Calculated column vs Measure Also, define Row context and Filter context with simple examples.

Calculated Column vs Measure

Calculated Column

A calculated column is created using DAX and is calculated row by row.The value is stored in the table and increases data size.

Example:- Total Price = Sales[Quantity] * Sales[Unit Price]

Measure

A measure performs calculations on aggregated data.It is calculated on the fly based on filters and visuals.It does not store data, so it is memory efficient.

Example:- Total Sales = SUM(Sales[Total Price])

Row Context

Row context means DAX evaluates data one row at a time.It is automatically created in calculated columns.

Example:- Profit = Sales[Revenue] - Sales[Cost]

Filter Context

Filter context refers to the filters applied to data (like slicers, rows, columns, or visual filters).It affects how measures are calculated.

Example:-If a report has a slicer for Year = 2024, then:

Total Sales = SUM(Sales[Amount])

5.What is the difference between a report and a dashboard in Power BI?

Difference between Report and Dashboard in Power BI

Define Power BI and What are the key components of the Power BI ecosystemReport

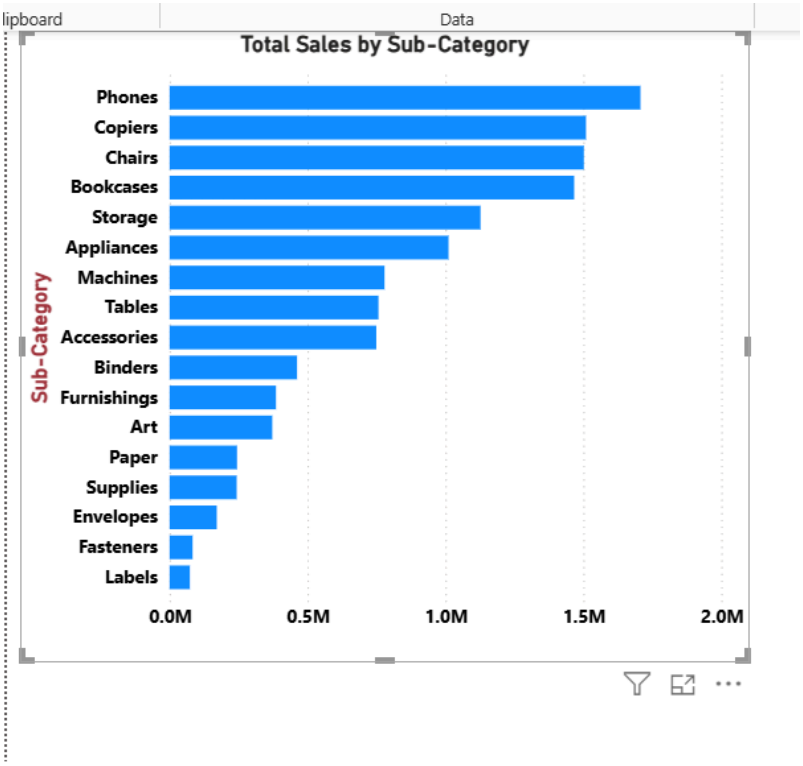
A report is a detailed, multi-page analysis.Created in Power BI Desktop.Can have multiple pages with charts, tables, slicers, and filters.Used for in-depth analysis and exploration of data.Allows users to drill down and interact deeply with visuals.

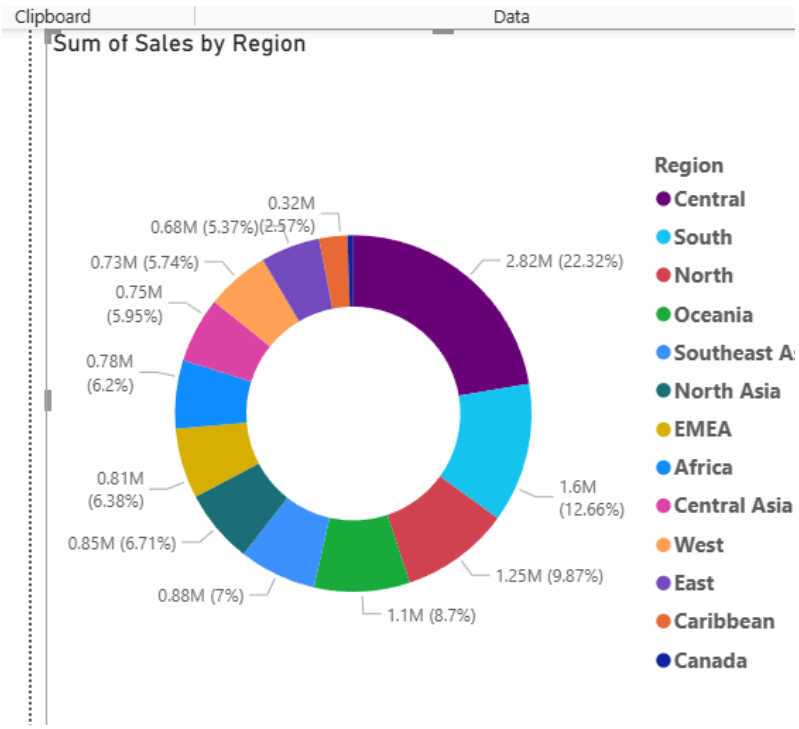
Dashboard

A dashboard is a single-page summary view.Created in Power BI Service (online).Contains tiles pinned from one or more reports.Used for high-level monitoring of key metrics (KPIs).Limited interaction compared to reports.

6. Using the Sample Superstore dataset:

- Create a Clustered Bar Chart to display Total Sales by Sub-Categore
- Create a Donut Chart for Sales % by Region Provide screenshots of both visuals.



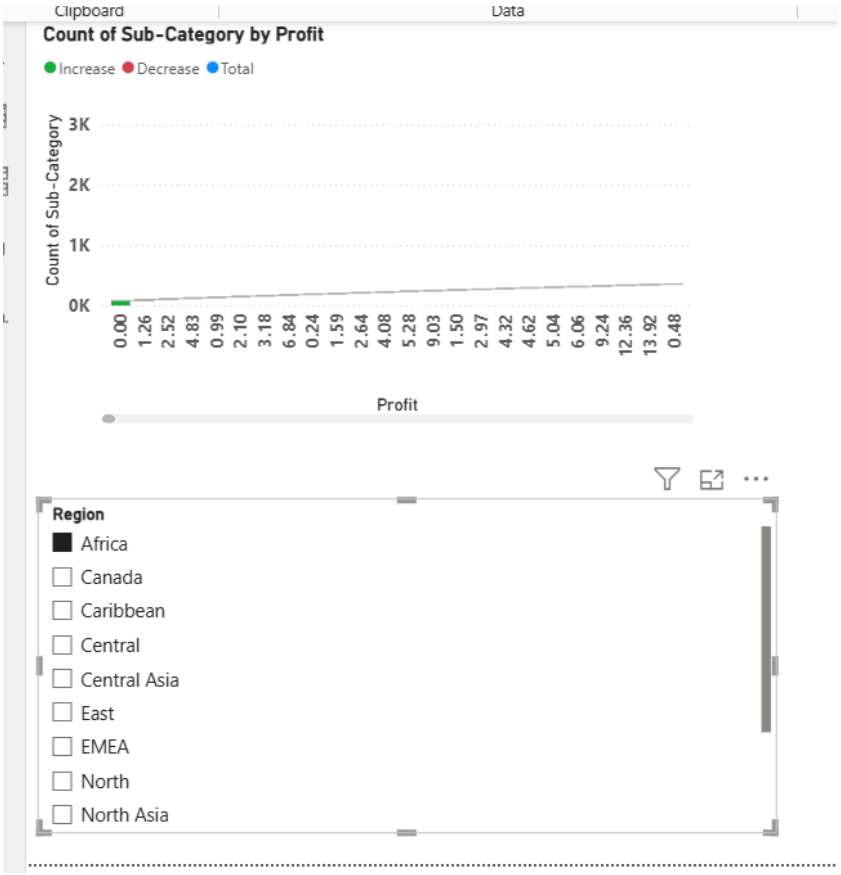


7. Write and apply the following measures:
● Total Profit = SUM([Profit])
● Average Discount = AVERAGE([Discount]) Display both in a KPI Card, and use a Line Chart to show profit trend over months.
Add visuals and DAX formulas.

8. Implement a DAX measure that calculates the percentage of total sales by product category.

PRODUCT_CATAGORY	Sum of SALES_AMOUNT
Automative	2600
Beauty Products	4400
Books	2000
Clothing	3000
Electronics	5000
Garden Supplies	1000
Home Appliances	7000
Jewelry	1800
Office Supplies	1000
Sports Equipment	1200
Tables & Chairs	8000
Toy	1500
Total	38500

9. Create a DAX Measure for Total Profit
● Use it in a Waterfall Chart to analyze how different Sub-Categories contribute to overall profit
● Add a Slicer for Region to filter the visual
● Write brief business insights (4–5 lines) from the chart and provide 2–3 data-driven recommendations to improve profit.



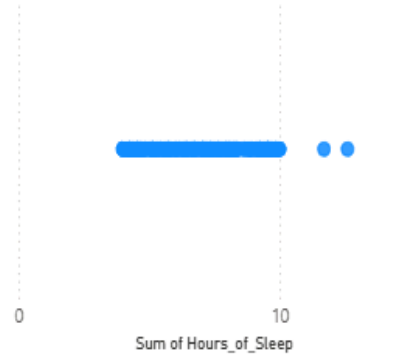
10. Scenario: VitaTrack Wellness, a digital health company in FitZone, has collected data on users' daily habits and health vitals. The analytics team is tasked with drawing actionable insights from this data to improve lifestyle suggestions and prevent heart-related risks. Your Task: Using the provided dataset (includes Age, Gender, BMI, Steps, Calories, Sleep, Heart Rate, Blood Pressure, Smoking, Alcohol, Exercise, Diabetic & Heart Disease status): Build a one-page Power BI dashboard that answers:

1. Are users maintaining a balanced lifestyle (Steps, Sleep, Calories)
2. What lifestyle patterns (Smoking, Alcohol, BMI, etc.) indicate heart disease risk?
3. Is there any visible relationship between Sleep and Physical Activity?
4. How does BMI vary across Age Groups and Genders?
5. What is the impact of smoking and alcohol on heart rate and blood pressure? 6. Segment people based on their health activity to suggest lifestyle changes

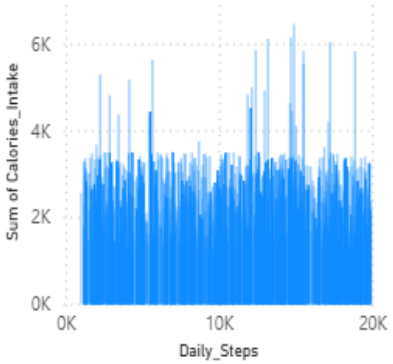
10.93K
AVG STEP

7.00
AVG SLEEP

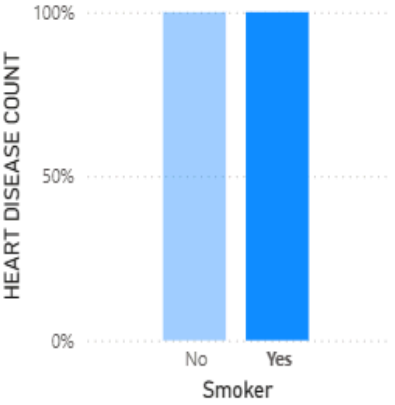
Sum of Hours_of_Sleep by Daily_Steps



Sum of Calories_Intake by Daily_Steps



HEART DISEASE COUNT by Smoker



avg BMI by Age and Gender